**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

PERSONALIZED MEDIA COMMUNICATIONS, LLC,
 	
        Plaintiff,
 	
  v.
 	
GOOGLE LLC,
 	
        Defendant.
	Civil Action No. _____
	
	 JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Personalized Media Communications, LLC ("PMC"), as and for its Complaint against Defendant Google LLC ("Google"), alleges as follows:

THE PARTIES

1. PMC is a limited liability company organized and existing under the laws of the State of Texas, having its principal place of business at 14090 Southwest Freeway, Suite 450, Sugar Land, Texas 77478.

2. On information and belief, Google is a Delaware corporation with its principal office at 1600 Amphitheatre Parkway, Mountain View, CA 94043. Google offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Texas and in the judicial Eastern District of Texas.

JURISDICTION AND VENUE

3. PMC brings this action for patent infringement under the patent laws of the United States, 35 U.S.C. § 271 *et seq*. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

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4. This Court has personal jurisdiction over Google in this action because Google has committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Google would not offend traditional notions of fair play and substantial justice. Google has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the asserted patents.

5. Google is a multinational technology company that collects, stores, organizes, and distributes data. Google has a substantial presence in the District through the products and services Google provides residents of this District, including delivering digital content.

6. Google describes itself as an "information company."[1] Its vision is "to provide access to the world's information in one click," and its mission is "to organize the world's information and make it universally accessible and useful."[2] Making information available to people wherever they are and as quickly as possible is critical to Google's business.

7. Google's CEO, Sundar Pichai, explained, "We want to make sure that no matter who you are or where you are or how advanced the device you are using—Google works for you."[3] To meet this goal, Google developed a content delivery network that it calls the Edge Network.

8. Google's Edge Network is one example of Google's physical presence in this District. Google provides web-based services, such as YouTube and YouTube TV, to users

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[1] *See* "This Year's Founder's Letter" by Alphabet CEO, Sundar Pichai, https://blog.google/inside-google/alphabet/this-years-founders-letter/.

[2] http://panmore.com/google-vision-statement-mission-statement.

[3] http://time.com/4311233/google-ceo-sundar-pichai-letter/.

throughout the world. These services are in high demand. Google reports that YouTube serves over 1.8 billion users per month.[4] Studies show that YouTube alone is responsible for approximately 20% of all internet traffic.[5] YouTube TV, which has been described as an "add-on to YouTube" allows Google to essentially become the local TV provider for residents of this District. For example, residents in this District obtain local Dallas-Fort Worth area channels such as WFAA, ABC (Channel 8); CBS (Channel 11); NBC (Channel 5); and Fox (Channel 4).[6]
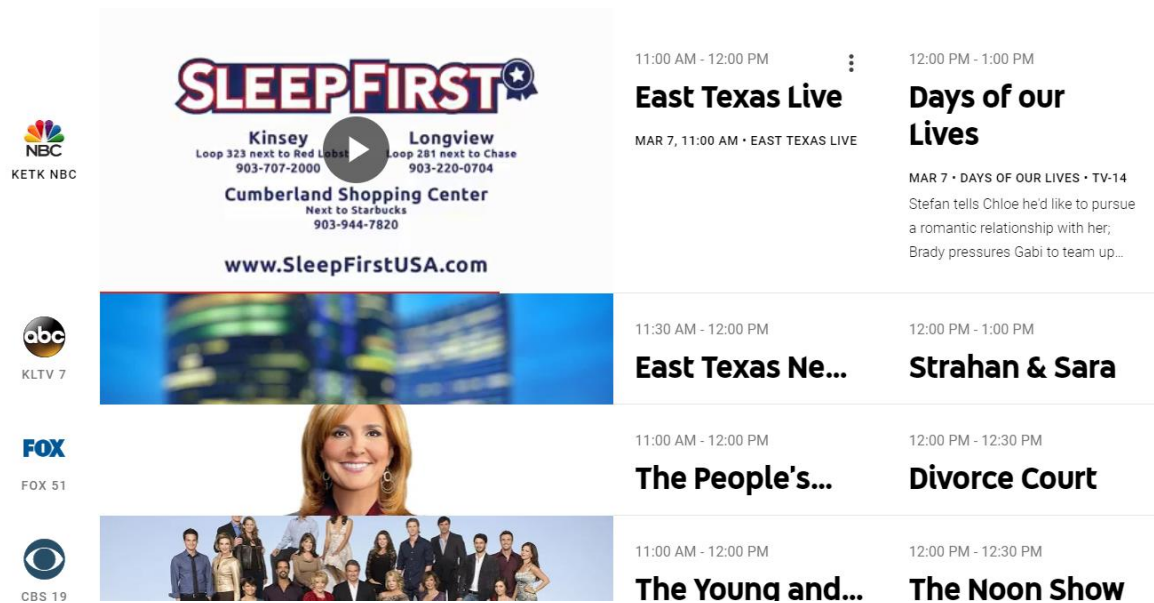
Source: https://tv.youtube.com/live (as accessed from this District). To verify a resident should receive such local channels, Google verifies the location of such resident.

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[4] *See* https://www.theverge.com/2018/5/3/17317274/youtube-1-8-billion-logged-in-monthly-usersbrandcast-2018.

[5] *See* https://www.sandvine.com/hubfs/downloads/archive/2016-global-internet-phenomenareport-latin-america-and-north-america.pdf and http://testinternetspeed.org/blog/half-of-allinternet-traffic-goes-to-netflix-and-youtube/.

[6] *See*, e.g. https://support.google.com/youtubetv/answer/7068923?hl=en and https://support.google.com/youtubetv/answer/7370552?hl=en&ref_topic=7071745.

9.   Google's Edge Network itself has three elements: Core Data Centers, Edge Points of Presence, and Edge Nodes. The Core Data Centers (there are eight in the United States) are used for computation and backend storage. Edge Points of Presence are the middle tier of the Edge Network and connect the Data Centers to the internet. Edge Nodes are the layer of the network closest to users. Popular content, including YouTube TV and YouTube, is cached on the Edge Nodes, which Google refers to as Google Global Cache or "GGC".

10. Google Global Cache is recognized as "one of Google's most important pieces of infrastructure,"[7] and Google uses it to conduct the business of providing access to the world's information. GGC servers in the Edge Nodes function as local data warehouses, much like a shoe manufacturer might have warehouses around the country. Instead of requiring people to obtain information from distant Core Data Centers, which would introduce delay, Google stores information in the local GGC servers to provide quick access to the data.

11. Caching and localization are vital for Google's optimization of network resources. Because hosting all content everywhere is inefficient, it makes sense to cache popular content and serve it locally. Doing so brings delivery costs down for Google, network operators, and internet service providers. Storing content locally also allows it to be delivered more quickly, which improves user experience. Serving Edge Network content from servers closer to the user improves performance and user happiness. To achieve these benefits, Google has placed Edge Nodes throughout the United States, including in this District. Google describes these nodes as the "workhorse[s] of video delivery." *Seven Networks, LLC v. Google, LLC*, Case No. 2:17-cv-00442-JRG (E.D. Tex)(Jul. 19, 2018) at Page 16.

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[7] *See* http://blog.speedchecker.xyz/2015/11/30/demystifying-google-global-cache/.

12. Just like brick-and-mortar stores, Google's GGC servers independently determine what content to cache based on local requests. The GGC servers in Google's Edge Nodes include software that Google refers to as "µstreamer." µstreamer is responsible for serving video content from YouTube and other Google services. It operates on a content-delivery platform at the edge of Google's network called "bandaid"; it does not run in the core (except for some internal testing purposes), unlike the majority of the Google services, such as search or gmail.

13. Using µstreamer and bandaid, a GGC server handles requests directly from its clients, predominantly YouTube's video players. When such a request is received, if the content is stored in the node's local cache, the node will serve it to the end user, improving the user experience and saving bandwidth. If cache-eligible content is not already stored on the node, and the content is cache-eligible, the node will retrieve it from Google, serve it to the user, and store it for future requests.

14. µstreamer is largely autonomous, in the sense that almost all decisions related to serving a particular request are made locally, without coordinating with other servers. Like a brick-and-mortar store sells directly to customers from inventory and stocks that inventory based on local customer demand, µstreamer in each GGC node decides—independently from other nodes in Google's Edge Network—whether to serve requested content, whether to cache content, and whether to send requests to other servers.

15. Google's GGC servers are housed in spaces in the District leased by Google. Google's GGC servers are housed in spaces leased by Google from Internet Service Providers (ISPs), whose networks handle substantial traffic for Google and are interested in saving bandwidth. Hosting Google servers allows ISPs to save both bandwidth and costs, as they do not incur the expense of carrying traffic across their peering and/or transit links.

16. For one non-limiting example, web traffic analysis indicates that, when streaming certain YouTube video content from the District, Google hosts that video content on a server named "r1---sn-n0qqxoapo3-jaal.googlevideo.com." The IP address associated with that server is 208.180.168.44, and the physical location associated with that IP address is in Tyler, Texas, which is in this District. Indeed, packet tracing software indicates that the client computer requesting the relevant video content is connected to the server described above.

17. When an ISP agrees to host a GGC server, the parties enter into a Global Cache Service Agreement, under which Google provides:

- hardware and software— including GGC servers and software—to be housed in the host's facilities;

- technical support; service management of the hardware and software; and

- content distribution services, including content caching and video streaming.

In exchange, the host provides, among other things, a physical building, rack space where Google's computer hardware is mounted, power, and network interfaces. All ownership rights, title, and intellectual property rights in and to the equipment (i.e., the hardware and software provided by Google) remain with Google and/or its licensors.

18. Multiple ISPs hosted GGC servers are in this District. Google provides the location of its GGC servers, namely Sherman, Tyler, and Texarkana.
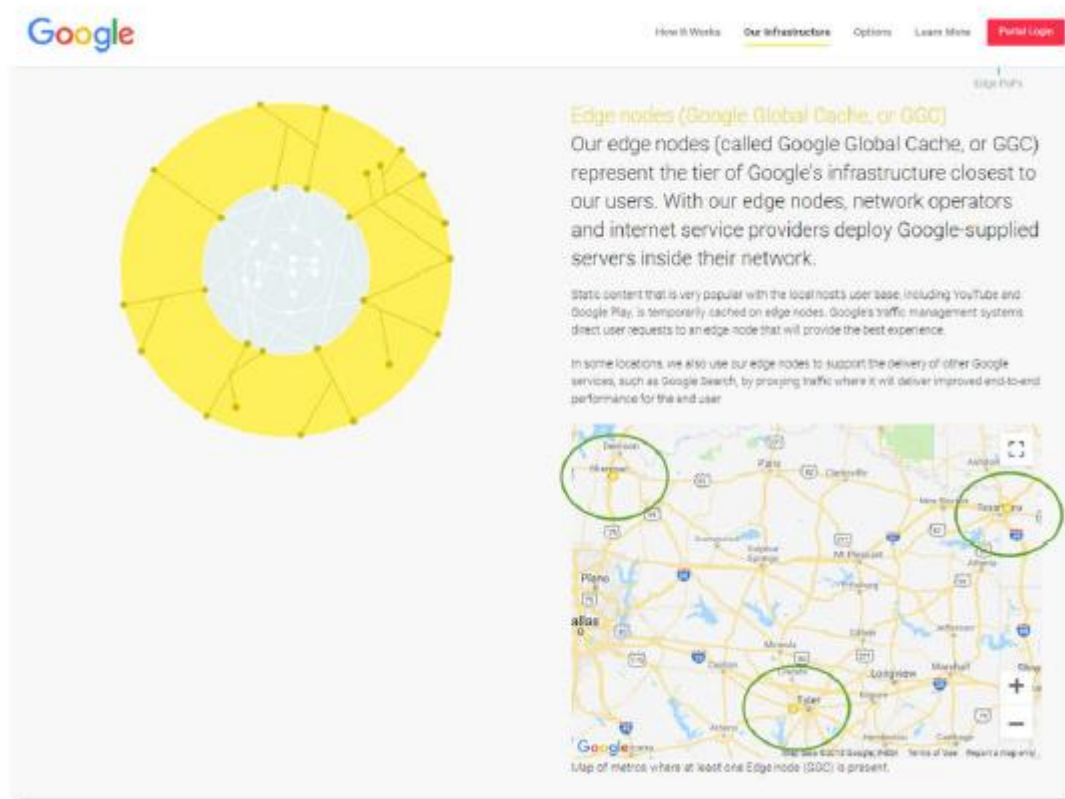
Source: https://peering.google.com/#/infrastructure

19. Suddenlink Communications, for example, is an ISP that hosts six GGC servers in Tyler, Texas.

20. CableOne is an ISP that hosts three GGC servers in Sherman, Texas, and three GGC servers Texarkana, Texas.

21. Google caches content on these GGC servers located in this District.

22. Google's GGC servers located in this District deliver cached content to residents in this District.

23. Google generates revenue from its activities in this District by, among other methods, delivering video advertising through YouTube and YouTube TV and charging subscription fees for certain YouTube services.

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24. Google treats its GGC servers in this District the same as it treats all of its other GGC servers in the United States.

25. The photographs below show Google's GGC servers hosted by Suddenlink and the building where they are located at 322 North Glenwood Boulevard, Tyler, Texas 75702.

Exterior   Interior Rack Spaces   Google GGC Servers

Source: *Seven Networks, LLC v. Google, LLC*, Case No. 2:17-cv-00442-JRG (E.D. Tex)(Jul. 19, 2018) at Page 18.

26. Google not only exercises exclusive control over the digital aspects of the GGC servers, but also exercises exclusive control over the physical server and the physical space within which the server is located and maintained. Pursuant to Google's agreements with the ISPs that host GGC servers in this District, ISPs must provide Google with rack space, power, network interfaces, IP addresses, remote assistance, installation services, and remote high bandwidth access within parameters specified by Google. Google, and not the ISPs, own the GGC servers in this District, which ISPs must return to Google in the event the agreements are terminated. ISPs may not relocate any GGC server without permission from Google, which Google may withhold at its sole discretion, and may not perform tasks such as physically switching toggle switches, power cycling equipment, or tightening equipment screws without step by step instructions from Google.

27. This District has previously determined that the GGC server itself and the place of the GGC server, both independently and together, meet the statutory requirement of a "physical place." *See Seven Networks, LLC v. Google, LLC*, Case No. 2:17-cv-00442-JRG (E.D. Tex)(Jul. 19, 2018) at Page 24.

28. Likewise, this District has determined that GGC servers and their several locations within this District constitute "regular and established place[s] of business" within the meaning of the special patent venue statute *See Seven Networks, LLC v. Google, LLC*, Case No. 2:17-cv-00442-JRG (E.D. Tex.)(Jul. 19, 2018) at page 38.

29. Similarly, this District has determined that the GGC servers and their locations within the various ISPs within this District are "places of Google" sufficient to meet the statutory requirement of § 1400(b). *See Seven Networks, LLC v. Google, LLC,* Case No. 2:17-cv-00442-JRG (E.D. Tex.)(Jul. 19, 2018) at page 41.

30. Because Google uses its GGC servers to provide content such as YouTube to residents of this District, Google's infringement of PMC's patents—which, as described below, relate to adaptive video streaming—is substantially related to its regular and established places of business in this District. Many of the claims discussed herein relate to Google's server architecture generally and Edge Nodes specifically.

THE CLAIMED TECHNOLOGY

31. The technology claimed in this case relates to adaptive video streaming, which enables content providers like Google to serve each user the highest possible quality video over the Internet. Adaptive streaming permits Internet video content providers to serve users with content tailored to each specific user's device and Internet connection. Without adaptive streaming, streaming Internet video content can suffer from poor quality and delivery delays.

32. PMC's discoveries are embodied in U.S. Patent Nos. 7,747,217 (the "'217 Patent"), 7,769,344 (the "'344 Patent"), 7,865,920 (the "'920 Patent"), 8,601,528 (the "'528 Patent"), 8,739,241 (the "'241 Patent"), and 9,674,560 ((the "'560 Patent") (collectively, the "Patents-in-Suit").

33. On June 29, 2010, the United States Patent and Trademark Office duly and lawfully issued the '217 Patent, entitled "Signal Processing Apparatus and Methods," based upon an application filed by inventors John Christopher Harvey and James William Cuddihy. The '217 patent is directed to combining separate and distinct media to create a multimedia presentation. The media within the presentation are coordinated such that one medium is related to, and augments a second medium. Key to the invention is the use of identifiers associated with received media, which the receiver station processes in order to identify which of the received media are to be combined to generate the coordinated presentation. This invention was made in 1981 and represented a significant advance over what was conventional then. Advantages of the '217 invention over prior technologies include, but are not limited to: personalization of media presentations; receiver-controlled reception, identification, and selection of different but related media from separate external sources; and receiver generation of a multimedia presentation through the processing and coordinated display of at least two separate media. A true and correct copy of the '217 Patent is attached hereto as Exhibit A.

34. On August 3, 2010, the United States Patent and Trademark Office duly and lawfully issued the '344 Patent, entitled "Signal Processing Apparatus and Methods," based upon an application filed by inventors John Christopher Harvey and James William Cuddihy. The '344 patent is directed to remotely and dynamically reprogramming receiver station software to facilitate receiving video programming. This invention was made in 1981 and represented a

significant advance over what was conventional then. Conventional systems of 1981—typically a television and cable box—did not have the capacity for remote reprogramming. In contrast, the '344 invention generates and sends a request for a set of instructions via a network connection of a processor operating under the control of another set of instructions. In response to the request, the set of instructions are transmitted to the receiver station where they are received and executed to enable the receiver station to receive video media. Advantages of the '344 invention over prior technologies include, but are not limited to: fully automated updates to receiver station software; extension of receiver station operating life; standardization of receiver station software within a network; and the remote addition of new features and capabilities to a receiver station. A true and correct copy of the '344 Patent is attached hereto as Exhibit B.

35. On January 4, 2011, the United States Patent and Trademark Office duly and lawfully issued the '920 Patent, entitled "Signal Processing Apparatus and Methods," based upon an application filed by inventors John Christopher Harvey and James William Cuddihy. The '920 patent is directed to remotely controlling systems within a media distribution network. The invention was made in 1987 and represented a significant advancement over conventional media distribution available at the time. Network control is facilitated through the incorporation of selective communication devices (e.g. switches) within the transmission station hardware, with the switches in turn being controlled by network signals in combination with transmission station data stored in memory at the transmitter. Advantages of the '920 invention over prior technologies include, but are not limited to: network control of audio/video programming storage at an intermediate transmission station and network control of audio/video programming transmission by the intermediate transmission station. A true and correct copy of the '920 Patent is attached hereto as Exhibit C.

36. On December 3, 2013, the United States Patent and Trademark Office duly and lawfully issued the '528 Patent, entitled "Signal Processing Apparatus and Methods," based upon an application filed by inventors John Christopher Harvey and James William Cuddihy. The '528 Patent is directed to controlling a receiver station to skip over video frames if the receiver station detects that they are incomplete. The invention uses data associated with a television signal to determine if a video image within the signal is complete. The data is either contained within, or received with the television signal, and is processed at the receiver station to make the determination. If the image is incomplete, the receiver station will prevent the image from being displayed and will automatically advance to subsequent information received with the television signal. The invention was made in 1987 and represented a significant advancement over conventional technology systems of that time, which, as a non-limiting example, had no capability to skip the display of incomplete video images. A true and correct copy of the '528 Patent is attached hereto as Exhibit D.

37. On May 27, 2014, the United States Patent and Trademark Office duly and lawfully issued the '241 Patent, entitled "Signal Processing Apparatus and Methods," based upon an application filed by inventors John Christopher Harvey and James William Cuddihy. The '241 patent is directed to remotely controlling systems within a media distribution network. Network control is facilitated through the inclusion of signals transmitted with the television programming. At least one of the signals is used to control subsequent transmission based on programming identification information previously stored at the intermediate transmitter station; and at least one of the signals is transmitted to the receiver station where it is processed to facilitate the output of the television programming. The invention was made in 1981 and represented a significant advancement over conventional technology systems of that time.

Advantages of the '241 invention over prior conventional technology systems include, but are not limited to: network control of television programming storage and transmission at an intermediate transmitter station and network control of the receiver station to output the television program. A true and correct copy of the '241 Patent is attached hereto as Exhibit E.

38. On June 6, 2017, the United States Patent and Trademark Office duly and lawfully issued the '560 Patent, entitled "Signal Processing Apparatus and Methods," based upon an application filed by inventors John Christopher Harvey and James William Cuddihy. The '560 patent is directed to remotely controlling systems within a media distribution network. Network control of storage is realized by including control signals in the transmission of media to an intermediate transmission station. The control signals will facilitate the selection of received media for storage at the intermediate transmission station based on operating records stored there, cause the intermediate transmission station to select a storage location for the media, and cause the operating records to be updated to reflect reception and storage of the received media. The invention was made in 1987 and represented significant advancement over prior conventional technology systems in media storage and tracking, for non-limiting examples. A true and correct copy of the '560 Patent is attached hereto as Exhibit F.

39. The Patents-in-Suit generally relate to methods and systems for digital signal processing, which enable adaptive streaming.

40. PMC owns all right, title, and interest in and to the Patents-in-Suit and possesses all rights of recovery.

FACTUAL ALLEGATIONS

The Company

41. PMC is a family-run company that was founded by inventor and PMC Chairman John Harvey. PMC's Chairman, along with his co-inventor James Cuddihy, made numerous inventions in the early 1980s (collectively referred to hereinafter as "the Harvey Inventions") which have been the basis for nearly 100 patents.

42. PMC operates from Sugar Land, Texas. Its intellectual property commercialization and licensing activities have directly created jobs for engineers, technical specialists, management personnel, and counsel.

43. PMC's inventors created a visionary portfolio of intellectual property that covers a whole system of related technologies. Taken together, the system they invented in the early 1980's created possibilities unknown to those familiar with what was routine and conventional at the time. For example, content providers could use the control and information signals in these inventions to provide subscribers with personalized content. Content providers could use other PMC inventions to protect their content from piracy, and they could do so in consistent and cost-effective ways which were fully automated. PMC's patents also disclose and claim apparatuses and processes that improved on contemporary technology by adding capabilities to transmitter and receiver stations using remotely supplied software updates.

44. PMC first attempted to commercialize the Harvey Inventions' technology internally. From 1989 to 1992, in the pre-Internet era, the company developed and publicly disclosed a television system prototype that demonstrated many of its patented personalization and access control concepts.

45. The company also sought partnerships with more-established companies to jointly develop, market, and manufacture commercial embodiments of PMC's technology. PMC and its predecessor, Personalized Mass Media Corporation, made multiple attempts in the 1990's to market the Harvey Inventions by contacting a number of large technology companies. PMC entered into agreements with industry leaders, including General Electric, to explore the technology's possibilities. PMC also contracted with Sarnoff Labs to develop software implementing features of the Harvey Inventions to demonstrate the technology's potential.

46. Most of these established firms eventually decided not to pursue the Harvey Inventions at that time. A few forward-focused firms, however, including Starsight and Gemstar (now subsidiaries of TiVo), did recognize the technological significance of the Harvey inventions and became some of PMC's first licensees.

47. Substantial improvements to computer networks have enabled many firms to adopt and take advantage of the foundational contributions made by the Harvey Inventions. The Harvey Inventions have now received significant industry recognition and have been licensed by some of the world's most sophisticated and respected content and network companies. PMC has licensed its patented technology to Sony, Motorola, Sharp, Panasonic, DirecTV, DISH Network, EchoStar, FOX, The Weather Channel, Gemstar-TV Guide (now a subsidiary of TiVo), Cisco, Arris, Samsung, Vizio, Funai, Tongfang, Haier, and TCL, among others. PMC's patented technology makes content more relevant, more secure, and more reliable—all enhancements that directly contribute to licensees' profits.

48. PMC has never enforced third-party patents. PMC exclusively enforces the fruits of PMC's inventors, John Harvey and James Cuddihy.

49. This Court is familiar with PMC, and at least the '217 Patent, in addition to the patents from which the other Patents-in-Suit claim priority, having previously presided over numerous related cases, including *Personalized Media Communications, LLC v. TCL Corp. et al*, Case No. 2-17-cv-00433-JRG; *Personalized Media Communications, LLC v. Hisense Co. Ltd. et al*, Case No. 2-17-cv-00437-JRG-RSP; *Personalized Media Communications, LLC v. Haier America Company, LLC et al*, Case No. 2-17-cv-00438-JRG; *Personalized Media Communications, LLC v. Tsinghua Tongfang Co., Ltd. et al*, Case No. 2-17-cv-00439-JRG; *Personalized Media Communications, LLC v. Funai Electric Co., Ltd.*, Case No. 2-16-cv-00105-JRG-RSP; *Personalized Media Communications, LLC v. Samsung Electronics America, Inc. et al*, Case No. 2-15-cv-01754-JRG-RSP; *Personalized Media Communications LLC v. Apple Inc.*, Case No. 2-15-cv-01366-JRG-RSP; *Personalized Media Communications, LLC v. TPV Int'l (USA), Inc. et al*, Case No. 2-15-cv-01206-JRG-RSP; *Personalized Media Communications, L.L.C. v. Zynga, Inc*., Case No. 2-12-cv-00068-JRG-RSP; and *Personalized Media Communications, L.L.C. v. Motorola, Inc., et. al*., Case No. 2-08-cv-00070-RSP.

Defendant and the Accused Products

50. As referred to in this Complaint, and consistent with 35 U.S.C. § 100(c), the "United States" means "the United States of America, its territories and possessions."

51. Upon information and belief, including based on products identified on Google websites, Google makes, uses, offers to sell, and/or sells in the United States, and/or imports into the Unites States, methods, services, systems, and products made in accordance with the Patents-in-Suit, including, but not limited to Google's YouTube, YouTube Premium, YouTube Movies & Shows, and YouTube TV services, and Google's Content Distribution Network ("CDN") and/or "Edge Network," including its components such as origination servers and core data

centers, edge nodes such as Points of Presence and Google Global Cache devices, Google software running on various Google servers and appliances, and Google's YouTube video player in website or software application form distributed by Google to end users (collectively, "Accused Google Products and Services").

52. Upon information and belief, Google actively and knowingly directs, causes, induces, and encourages others, including, but not limited to, its designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States, products made in accordance with the Patents-in-Suit, including, but not limited to, the Accused Google Products and Services, by, among other things, providing instructions, manuals, and technical assistance relating to the installation, set up, use, operation, and maintenance of said Accused Google Products and Services.

53. On information and belief, YouTube LLC is a wholly-owned subsidiary of Google, which is controlled by Google. To the extent that any infringing step alleged below is performed by YouTube LLC, Google directs and controls such infringing step by provisioning relevant source code to YouTube LLC, requiring the infringing functionality from YouTube LLC, requiring the use of Google's CDN/Edge Network, and hosting the relevant YouTube LLC content.

Notice of Infringement

54. PMC and Google began negotiating a possible patent license approximately ten years ago. Since that time, PMC and Google engaged in protracted efforts to discuss Google's infringement of and a possible license to Google of PMC's patents.

55. On or about October 3, 2011, PMC and Google met to discuss a licensing deal. At that meeting, PMC provided Google information about Google's infringement of at least the '217, '344, and '920 Patents.

56. Over years, Google continued to express interest in licensing PMC's patents, but never took a license to any of PMC's patents.

57. In view of the above, Google received actual notice of at least the '217, '344, and '920 Patents and Google's infringement thereof, prior to this lawsuit.

58. Google has notice of the '528, '241, '560 Patents at least as of the time of the filing of this Complaint.

COUNT I: INFRINGEMENT OF THE '217 PATENT

59. PMC incorporates the preceding paragraphs as if fully set forth herein.

60. Upon information and belief, Google has infringed at least claims 1-3, 9, 11-12, 16-18, and 20-22 of the '217 Patent, pursuant to 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in the United States, and/or importing into the United States Accused Google Products and Services. For example, claim 1 of the '217 Patent recites a "method of outputting a multimedia presentation at a receiver station adapted to receive a plurality of signals." Google outputs multimedia presentations at devices running Google software (in app or website format), such as a smartphone, tablet, TV, computer, or a gaming console. Claim 1 recites: "receiving said plurality of signals including at least two media which include a first medium received in a digital data channel from a source external to said receiver station;" "storing information from said first medium in a storage medium at a computer at said receiver station;" "determining content, through use of processor instructions resident on said computer at said receiver station, of each medium received after said first medium in said plurality of signals, wherein determining

content of each medium comprises:" "processing an identifier which identifies said content of each of said medium:" "comparing said processed identifier to a predetermined identifier, wherein said predetermined identifier is determined at a time prior to receiving said plurality of signals;" "coordinating, through use of processor instructions resident on said computer at said receiver station, a presentation using said information with a presentation of a medium comprising an identifier that matches said predetermined identifier based on said step of determining content; and" "outputting and displaying said multimedia presentation to a user at said receiver station based on said step of coordinating such that said presentation using said information has a predetermined relationship to said content of said medium comprising an identifier that matches said predetermined identifier and said content of said medium comprising an identifier that matches said predetermined identifier explains a significance of said presentation using said information." Google's YouTube video player receives one or more TCP/IP packets, which include audio/video signals (the first medium) for the title requested by the user through the Google YouTube software, and preview thumbnail images for that title (the second medium), with the audio/video signals received from a Google edge node or Core Data Center (source external to said receiver station) in a digital data channel, such as a TCP connection; stores such audio/video signals in the computer memory of the devices running Google YouTube software; Google uses processor instructions on such devices to determine the content of each medium received after said first medium in said plurality of signals; in order to determine such content, Google processes at least one identifier (such as a TCP destination port number included in headers of packets received by Google), compares said processed identifier to a predetermined identifier (such as comparing the port number in the received header to the port number assigned to the connection between the device running YouTube software and a

Google edge node or core data center, where a port number is assigned to the connection before the devices running YouTube software receive the plurality of signals); Google identifies the content of the second medium when, for example, the TCP destination port identifies preview thumbnail images; through the use of the processor instructions, Google coordinates the presentation of information (for example, an overlay of the playback of the requested title) with a presentation of the medium comprising an identifier that matches the predetermined identifier (for example, preview thumbnail corresponding to the location of the progress bar over which the user hovers the pointing device); based on such coordination, Google outputs and displays such a multimedia presentation to the user at the device running YouTube software; the presentation has a predetermined relationship to said content of said medium comprising an identifier that matches said predetermined identifier (for example, displaying the preview thumbnail images at a given location of the progress bar is related to the audio/visual information at the corresponding time on the progress bar, with the relationship being predetermined before transmission and/or during encoding of the title); and said content of said medium comprising an identifier that matches said predetermined identifier explains a significance of said presentation using said information (for example, the preview thumbnail images explain a significance of the audio/video content that will follow or preceded that content that is currently playing). To the extent that any infringing step is performed by YouTube LLC, Google directs and controls such infringing step. Upon information and belief, Google's infringement pursuant to 35 U.S.C. § 271(a) is ongoing.

61. Upon information and belief, since having notice of the '217 Patent, Google has induced infringement of at least claims 1-3, 9, 11-12, 16-18, and 20-22 of the '217 Patent pursuant to 35 U.S.C. § 271(b), by actively and knowingly inducing, directing, causing, and

encouraging others, including, but not limited to, their designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States, Accused Google Products and Services made in accordance with the '217 Patent, by, among other things, providing instructions, manuals, and technical assistance relating to the installation, set up, use, operation, and maintenance of said Accused Google Products and Services. For example, where acts constituting direct infringement of claim 1 of the '217 Patent are not performed by Google, such acts constituting direct infringement are performed by Google's designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, who act at the direction and/or control of Google, with Google's knowledge. Upon information and belief, Google's inducement of infringement pursuant to 35 U.S.C. § 271(b) is ongoing.

62. Upon information and belief, Google committed the foregoing infringing activities without license from PMC and with notice of the '217 Patent.

63. The acts of infringement by Google will continue unless enjoined by this Court.

64. PMC has been and will continue to be irreparably harmed and damaged by Google's infringement of the '217 Patent and has no adequate remedy at law.

<div align="center"><u>**COUNT II: INFRINGEMENT OF THE '344 PATENT**</u></div>

65. PMC incorporates the preceding paragraphs as if fully set forth herein.

66. Upon information and belief, Google has infringed at least claims 1 and 2 of the '344 Patent, pursuant to 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in the United States, and/or importing into the United States Accused Google Products and Services. For example, claim 1 of the '344 Patent recites a "method for reprogramming a

receiver station that receives television or radio programming, said receiver station having a data network connection to an external data network, a processor, an input device, and a data storage device." Google reprograms devices running YouTube video player software—such as personal computers, mobile devices, and televisions, which have CPUs, touch screens, data storage, and are connected to the Internet—by supplying programming. Claim 1 recites: "storing first operating instructions at said receiver station, executing said first operating instructions at said processor to perform a first function, said first operating instructions being different from permanent operating instructions permanently stored at said receiver station;" "generating a query at said receiver station, said query comprising a request by said receiver station for reprogramming;" "promulgating said query from said receiver station under control of said processor executing said first operating instructions through said data network connection to said external data network;" "receiving second operating instructions different from both said permanent operating instructions and said first operating instructions in response to said step of promulgating said query, said second operating instructions for controlling operation of said processor, wherein said first and said second operating instructions do not include audio data, video data, image data and any combination thereof;" "reprogramming said processor with said received second operating instructions;" "performing a second function by executing said second operating instructions at said processor, said second function including controlling reception of signals required to output a video programming transmission;" "receiving said signals required to output said video programming transmission;" "processing said signals to enable the output of said video programming transmission; and" "outputting said video programming transmission for display to a viewer." Google stores operating instructions, such as operating instructions received from a Google license server in response to a first license request; executes the

operating instructions—which are different from permanent operating instructions permanently stored at the devices running Google's YouTube software such as BIOS—to, for example, perform a first function such as initiating/enabling a subsequent license request at the receiver station; generates a query to be reprogrammed with a license for a portion of the television program, such as during playback; promulgates the query from the devices running YouTube video player software executing the first operating instructions over the Internet to Google's servers; in response to promulgating the query, Google receives second license operating instructions that are different than the permanent operating instructions and the first operating instructions described above; the first and second operating instructions do not include audio data, video data, image data and any combination thereof; Google reprograms the processor, such as by updating the Content Decryption Module with the received second license operating instructions; performs a second function by executing said second operating instructions included in the license, said second function including controlling reception of signals required to output a video programming transmission, such as performing the decryption process on subsequent audio or video contents of a television program, or portions thereof; receives signals containing video programming (such as the packets, containers, and frames comprising video); decodes the video frames to enable the output of said video programming; and outputs Google video programming to a viewer on a computer, mobile device, or digital television. To the extent that any infringing step is performed by YouTube LLC, Google directs and controls such infringing step. Upon information and belief, Google's infringement pursuant to 35 U.S.C. § 271(a) is ongoing.

67. Upon information and belief, since having notice of the '344 Patent, Google has induced infringement of at least claims 1 and 2 of the '344 Patent pursuant to 35 U.S.C. § 271(b),

by actively and knowingly inducing, directing, causing, and encouraging others, including, but not limited to, their designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States, YouTube and YouTube TV made in accordance with the '344 Patent, by, among other things, providing instructions, manuals, and technical assistance relating to the installation, set up, use, operation, and maintenance of said YouTube and YouTube TV. For example, where acts constituting direct infringement of claim 1 of the '344 Patent are not performed by Google, such acts constituting direct infringement are performed by Google's designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, who act at the direction and/or control of Google, with Google's knowledge. Upon information and belief, Google's inducement of infringement pursuant to 35 U.S.C. § 271(b) is ongoing.

68. Upon information and belief, Google committed the foregoing infringing activities without license from PMC and with notice of the '344 Patent.

69. The acts of infringement by Google will continue unless enjoined by this Court.

70. PMC has been and will continue to be irreparably harmed and damaged by Google's infringement of the '344 Patent and has no adequate remedy at law.

<div align="center">COUNT III: INFRINGEMENT OF THE '920 PATENT</div>

71. PMC incorporates the preceding paragraphs as if fully set forth herein. Upon information and belief, Google has infringed at least claims 7-9, 12, and 17-19 of the '920 Patent, pursuant to 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in the United States, and/or importing into the United States Accused Google Products and Services.

For example, claim 7 of the '920 Patent recites a "method of communicating programming to subscribers in a network, said network including one or more programming origination stations, a plurality of intermediate transmission stations, and a plurality of subscriber stations, each intermediate transmission station receiving audio or video programming from said origination stations, each intermediate transmission stations including one or more selective communications devices and a plurality of storage locations." Google communicates audio and video programming to its network of YouTube subscribers via its Core Data Centers and edge node infrastructure, including Points of Presence and Google Global Cache nodes and clusters, which includes server hardware that operates as selective communications devices and multiple flash or hard-disk drive storage drives. Claim 7 recites: "passing a plurality of units of audio or video programming to a transmitter at said one or more programming origination stations"; "passing to said transmitter at said one or more programming origination stations, data identifying said units of audio or video programming or subject matter included in said units of audio or video programming, said data effective to instruct"; "at least one of said plurality of intermediate transmission stations to indicate when to retransmit said plurality of units of audio or video programming to at least one of said plurality of subscriber stations, wherein data of one or more predetermined transmission station capacities is processed at said at least one of said plurality of intermediate transmission stations to identify one of said plurality of storage locations at which to store at least one said plurality of units of audio or video programming"; "wherein said identified storage locations are different for each of said plurality of units of audio or video programming, and"; "wherein said stored at least one of said plurality of units of programming is transferred from said identified one of said plurality of storage locations to another of said plurality of storage locations based on said data identifying said units of audio or video

programming or subject matter included in said units of audio or video programming and said data of one or more predetermined transmission station capacities; and"; "transmitting said plurality of units of audio or video programming and said data that identify said units of audio or video programming or a subject matter included in said units of audio or video programming to said plurality of intermediate transmission stations." Google passes units of audio and video for YouTube video programs to a network port or network interface card at one of Google's Core Data Centers; passes YouTube container data and metadata, and data indicating start and end of frames, such as an initialization segment, that identifies the units of audio or video programming, or subject matter included in said units of audio or video programming, to the transmitter described above; the data described above is effective to instruct an intermediate transmission station (a Google edge device such as a GGC) to indicate when to retransmit the units of audio/video programming to YouTube subscribers; Google edge devices process data relating to the type of device (such as an Edge Points of Presence (PoP) or Edge Nodes (GGCs)) and its storage to identify one of said plurality of storage locations in the edge network at which to store a unit of audio or video programming; in the storage used by Google, the identified storage locations are different for video data and audio data; based on information identifying the audio/video programming units (such as files and/or segments) and data of the transmission station capacities, Google transfers a file and/or segment of audio/video programming from an identified location in nonvolatile storage to another storage location in the Google edge network or nodes; and Google Core Data Centers send units (such as the segments and/or files) of audio/video programming and said data described above to the edge nodes. To the extent that any infringing step is performed by YouTube LLC, Google directs and controls such infringing

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step. Upon information and belief, Google's infringement pursuant to 35 U.S.C. § 271(a) is ongoing.

72. Upon information and belief, since having notice of the '920 Patent, Google has induced infringement of at least claims 7-9, 12, and 17-19 of the '920 Patent pursuant to 35 U.S.C. § 271(b), by actively and knowingly inducing, directing, causing, and encouraging others, including, but not limited to, their designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States, Accused Google Products and Services made in accordance with the '920 Patent, by, among other things, providing instructions, manuals, and technical assistance relating to the installation, set up, use, operation, and maintenance of said Accused Google Products and Services. For example, where acts constituting direct infringement of claim 7 of the '920 Patent are not performed by Google, such acts constituting direct infringement are performed by Google's designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, who act at the direction and/or control of Google, with Google's knowledge Upon information and belief, Google's inducement of infringement pursuant to 35 U.S.C. § 271(b) is ongoing.

73. Upon information and belief, Google committed the foregoing infringing activities without license from PMC and with notice of the '920 Patent.

74. The acts of infringement by Google will continue unless enjoined by this Court.

75. PMC has been and will continue to be irreparably harmed and damaged by Google's infringement of the '920 Patent and has no adequate remedy at law.

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COUNT IV: INFRINGEMENT OF THE '528 PATENT

76. PMC incorporates the preceding paragraphs as if fully set forth herein.

Upon information and belief, Google has infringed at least claims 21-27, 32, and 37-39 of the

'528 Patent, pursuant to 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in

the United States, and/or importing into the United States Accused Google Products and

Services. For example, claim 21 of the '528 Patent discloses a "method of controlling the display

of television programming at a receiver station, wherein said receiver station includes a monitor

for displaying said television programming, a receiver operatively connected to said monitor, and

a processor operatively connected to at least one of said monitor and said receiver." Google

performs a method of controlling the display of television programming at a receiver station

(such as a PC or laptop computer running the YouTube software in a browser or as an app),

wherein said receiver station includes a monitor for displaying said television programming, a

receiver (such as a wired or wireless network interface) operatively connected to said monitor,

and a processor (such as a CPU) operatively connected to at least one of said monitor and said

receiver. The methodology claimed in representative claim 21 comprises: "receiving an

information transmission including a television signal;" "passing at least a portion of said

information transmission to said processor;" "determining the absence of complete generated

television image data by processing information at least one of included in and received with

said television signal;" "determining a location of subsequent information for advancing to based

on said step of determining the absence of complete generated television image data;"

"advancing to the subsequent information received in said information transmission; and"

"preventing said monitor from displaying an incomplete television image based on said step of

determining the absence of complete generate television image data, wherein said method

controls the display of said television programming at said receiver station." Google receives, at a receiver station, packets (i.e., an information transmission) that carry a television signal, such as a YouTube title requested by the user; Google's YouTube player software passes segments of video to said processor; Google determines (via software running on the receiver station) the absence of complete generated television image data (for example, missing frames) by processing information included in and received with said television signal; based on the step of determining the absence of complete generated television image, Google determines a location of subsequent information (such as the next random access point in the stream) from which it can continue the video presentation; advances to the subsequent information received in said information transmission; and prevents said monitor from displaying an incomplete television image based on the step of determining the absence of complete generated television image data. With the above method, Google controls the display of the television programming at the receiver station. To the extent that any infringing step is performed by YouTube LLC, Google directs and controls such infringing step. Upon information and belief, Google's infringement pursuant to 35 U.S.C. § 271(a) is ongoing.

77. Upon information and belief, since having notice of the '528 Patent, Google has induced infringement of at least claims 21-27, 32, and 37-39 of the '528 Patent pursuant to 35 U.S.C. § 271(b), by actively and knowingly inducing, directing, causing, and encouraging others, including, but not limited to, their designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States, Accused Google Products and Services made in accordance with the '528 Patent, by, among other things, providing instructions, manuals, and technical assistance relating to the installation,

set up, use, operation, and maintenance of said Accused Google Products and Services. For example, where acts constituting direct infringement of claim 21 of the '528 Patent are not performed by Google, such acts constituting direct infringement are performed by Google's designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, who act at the direction and/or control of Google, with Google's knowledge. Upon information and belief, Google's inducement of infringement pursuant to 35 U.S.C. § 271(b) is ongoing.

78. Upon information and belief, Google committed the foregoing infringing activities without license from PMC and with notice of the '528 Patent.

79. The acts of infringement by Google will continue unless enjoined by this Court.

80. PMC has been and will continue to be irreparably harmed and damaged by Google's infringement of the '528 Patent and has no adequate remedy at law.

COUNT V: INFRINGEMENT OF THE '241 PATENT

81. PMC incorporates the preceding paragraphs as if fully set forth herein.

Upon information and belief, Google has infringed at least claims 16-17, 22, 30, 33-34, 36-37, and 39 of the '241 Patent, pursuant to 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in the United States, and/or importing into the United States Accused Google Products and Services. For example, claim 16 of the '241 Patent recites a "method of controlling an intermediate transmitter station to communicate television programming to a receiver station." Google controls its Edge Nodes (intermediate transmitter stations) to communicate television programming to a device (a receiver station) with YouTube software, such as an app or a browser viewing YouTube. Claim 16 recites: "receiving said television programming at an origination station;" "transmitting said television programming and a plurality of control signals

from said origination station to said intermediate transmitter station, said control signals for controlling the operation and identification of signals by controlling how and where to search for signals at the intermediate transmitter station and automatically controlling the operation of said intermediate transmitter station;" "receiving at said intermediate transmitter station said television programming and said plurality of control signals;" "transmitting said television programming and at least a first portion of said plurality of control signals from said intermediate transmitter station to said receiver station based upon at least a second portion of said plurality of control signals received at said intermediate transmitter station;" "receiving, at said receiver station, said at least a first portion of said plurality of control signals from said intermediate transmitter station;" and "receiving and displaying at a television display device at said receiver station said transmitted television programming based upon said at least a first portion of said plurality of control signals." Google receives television programs at Core Data Centers; transmits audio and video portions of the television programming, as well as a plurality of control signals (such as TCP/IP port identifiers, title identifiers, and container data and metadata), from origination servers (such as Core Data Centers) to Edge Points of Presence (PoP) or Edge Nodes (GGCs); such control signals control the operation and identification of signals at the edge nodes, which use the control signals to automatically find audio and video chunks, segments, fragments, and/or frames within numerous packets received by the Google Edge Nodes; Google receives the television programming and control signals at the Edge Points of Presence or Edge Nodes; transmits the television programming and at least a first portion of the control signals (such as container data and metadata embedded into or encapsulating the audio/video portions of the television programming used to decode video frames and audio portions) from Edge Points of Presence or Edge Nodes to receiver stations running YouTube video player software; this

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transmission is based upon at least a second portion of the control signals received at the Google Edge Points of Presence or Edge Nodes (such as title identifiers and container data and metadata encapsulating the audio/video portions of the television programming and identifying the titles, types of audio/video encoding, resolutions, and chunk offset information present) which is used to locate individual audio/video portions of television programming and send it to the YouTube video players; the Google YouTube video player software receives at least the first portion of control signals from Google Edge Points of Presence or Edge Nodes; and based on at least the first portion of control signals, the Google YouTube video player software controls the processing and display of the transmitted television programming. To the extent that any infringing step is performed by YouTube LLC, Google directs and controls such infringing step. Upon information and belief, Google's infringement pursuant to 35 U.S.C. § 271(a) is ongoing.

82. Upon information and belief, since having notice of the '241 Patent, Google has induced infringement of at least claims 16-17, 22, 30, 33-34, 36-37, and 39 of the '241 Patent pursuant to 35 U.S.C. § 271(b), by actively and knowingly inducing, directing, causing, and encouraging others, including, but not limited to, their designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States, Accused Google Products and Services made in accordance with the '241 Patent, by, among other things, providing instructions, manuals, and technical assistance relating to the installation, set up, use, operation, and maintenance of said Accused Google Products and Services. For example, where acts constituting direct infringement of claim 16 of the '241 Patent are not performed by Google, such acts constituting direct infringement are performed by Google's designers, manufacturers, suppliers, distributors, resellers, audio and

video integrators and consultants, software developers, customers, and/or end users, who act at the direction and/or control of Google, with Google's knowledge. Upon information and belief, Google's inducement of infringement pursuant to 35 U.S.C. § 271(b) is ongoing.

83. Upon information and belief, Google committed the foregoing infringing activities without license from PMC and with notice of the '241 Patent.

84. The acts of infringement by Google will continue unless enjoined by this Court.

85. PMC has been and will continue to be irreparably harmed and damaged by Google's infringement of the '241 Patent and has no adequate remedy at law.

COUNT VI: INFRINGEMENT OF THE '560 PATENT

86. PMC incorporates the preceding paragraphs as if fully set forth herein.

87. Upon information and belief, Google has infringed at least claims 4-10 of the '560 Patent, pursuant to 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in the United States, and/or importing into the United States the Accused Google Products and Services. For example, claim 5 of the '560 Patent recites a "method of communicating units of programming to a subscriber in a network, said network including at least one programming origination station, an intermediate transmission station, and at least one subscriber station, said intermediate transmission station transmitting said units of programming to said at least one subscriber station." Google communicates units of programming to its network of subscribers via its CDN infrastructure, including its origination servers (such as core data centers) and edge node servers, such as Google Global Cache nodes. The edge nodes transmit the units of programming, such as television programs, to the subscriber stations. Claim 5 recites: "receiving an information transmission containing a control signal from said origination station at said intermediate transmission station;" "detecting said control signal at said intermediate transmission station and

passing said control signal to a computer;" "controlling said intermediate transmission station based on said control signal to: select a portion of said units of programming based on operating records stored at said intermediate transmission station;" "receive said units of programming at said intermediate transmission station;" "communicate said selected a portion of said-units of programming to a storage location;" "store said selected a portion of said units of programming at said storage location;" "alter said operating records stored at said intermediate transmission station to indicate at least one of reception and storage of said selected a portion of units of programming; and" "subsequently transmitting said selected a portion of said-units of programming to said at least one subscriber station." For example, a Google edge node such as a Google Global Cache node receives a transmission with a control signal, such as container data and metadata encapsulating the audio/video portions of the television programming and identifying the titles, types of audio/video encoding, resolutions, and chunk offset information, from a Google core data center. Google edge nodes detect said control signal and pass it to a computer, such as the motherboard and processor of the edge node. Google controls the edge node based on the control signal, so that the edge node selects a portion of the units of programming, such as a portion of a television program, based on the operating records stored at the edge nodes of what portions of the television program are already stored at the edge node, receives television programming not already stored at the edge node, communicates the received television programming to a storage location on an edge node, such as a location on a solid state drive or a hard-disk drive, stores the received television programming at the location on a solid state drive or hard-disk drive, and alters the operating records to indicate the received portions of the television program.   Subsequently, the edge node transmits the received television programming to a subscriber station running Google YouTube player software. To the extent that

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any infringing step is performed by YouTube LLC, Google directs and controls such infringing step. Upon information and belief, Google's infringement pursuant to 35 U.S.C. § 271(a) is ongoing.

88. Upon information and belief, since having notice of the '560 Patent, Google has induced infringement of at least claims 4-10 of the '560 Patent pursuant to 35 U.S.C. § 271(b), by actively and knowingly inducing, directing, causing, and encouraging others, including, but not limited to, their designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, to make, use, sell, and/or offer to sell in the United States, and/or import into the United States YouTube and YouTube TV in accordance with the '560 Patent, by, among other things, providing instructions, manuals, and technical assistance relating to the installation, set up, use, operation, and maintenance of said YouTube and YouTube TV. For example, where acts constituting direct infringement of claim 4 of the '560 Patent are not performed by Google, such acts constituting direct infringement are performed by Google's designers, manufacturers, suppliers, distributors, resellers, audio and video integrators and consultants, software developers, customers, and/or end users, who act at the direction and/or control of Google, with Google's knowledge. Upon information and belief, Google's inducement of infringement pursuant to 35 U.S.C. § 271(b) is ongoing.

89. Upon information and belief, Google committed the foregoing infringing activities without license from PMC and with notice of the '560 Patent.

90. The acts of infringement by Google will continue unless enjoined by this Court.

91. PMC has been and will continue to be irreparably harmed and damaged by Google's infringement of the '560 Patent and has no adequate remedy at law.

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PRAYER FOR RELIEF

WHEREFORE, PMC prays for judgment in its favor against Google, and specifically, for the following relief:

A.   Entry of judgment in favor of PMC and against Google on all counts;

B.   Entry of judgment that Google has infringed the Patents-in-Suit;

C.   An order permanently enjoining Google, together with its officers, directors, agents, servants, employees, and attorneys, and upon those persons in active concert or participation with them, from infringing the Patents-in-Suit;

D.   An award of compensatory damages adequate to compensate PMC for Google's infringement of the Patents-in-Suit, in no event less than a reasonably royalty;

E.   Pre-judgment and post-judgment interest on PMC's award, in an amount according to proof; and

F.   All such other and further costs and relief as the Court deems just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, PMC hereby demands a trial by jury in this action of all claims so triable.

Dated: March 21, 2019   Respectfully submitted,

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